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HIGHLIGHTS

The Center for Research in Mathematics and Science Education (CRMSE) is an inter-disciplinary community of scholars who seek to advance mathematics and science education at local, state, and national levels by providing leadership in research into the learning and teaching of mathematics and science, as well as materials and program development, outreach, and evaluation. CRMSE members jointly operate the Ph.D. Program in Mathematics and Science Education (MSED) with the University of California at San Diego.

$3.5m NSF and Qualcomm Grant to Educate Science & Mathematics Teachers

Identifying and recruiting inquiry-oriented mathematics and science teachers and helping them become even more effective teachers, mentors, and leaders is the goal of a new SDSU program that was recently funded by the National Science Foundation and Qualcomm, Inc. Over the next five years, 32 San Diego teachers will participate in the SDSU Qualcomm Noyce Mathematics and Science Master-Teaching Fellowship Program, thanks to a unique public-private collaboration between the public sector and the private sector, with $3 million awarded from the NSF and an additional $500,000 from Qualcomm. Faculty members leading this program include Lisa Lamb, Randy Philipp, Donna Ross, and Meredith Houle Vaughn from the College of Education, and Susan Nickerson and Kathy Williams from the College of Sciences.

Other CRMSE highlights...

• $19.8 million in funded projects
• 30 faculty/emeritus members; 29 associate members (doctoral students or staff)
• MSED graduates
  ▪ Doctorates awarded to: Jennifer Lineback, Michelle Nolasco, John Siegfried, Michael Smith, George Sweeney, Ian Whitacre
• 3 Visiting Scholars
• 8 Colloquia
• 9 Special Events:
  ▪ Two SEE Seminars
  ▪ SDSU Science and Engineering Sampler
  ▪ San Diego Science & Engineering Festival and Expo
  ▪ Two Grand Openings and Receptions:
    1) Math Technology/CRMSE Innovation Lab
    2) MSED Sowder Library
  ▪ Judith Sowder Tribute and Conference
  ▪ Two fund-raising events for The Lab Zone
• 6 award-winning faculty:
  ▪ Nadine Bezuk, School of Teacher Education, 25 Years of Service
  ▪ Janet Bowers, Department of Mathematics and Statistics
  ▪ Fred Goldberg, Department of Physics, Faculty Emeritus
  ▪ Tom Impelluso, Department of Mechanical Engineering, Most Influential Professor
  ▪ Cynthia Park, School of Teacher Education
    Two awards:
    1) President’s Leadership Award for Faculty Excellence
    2) Alumni Outstanding Faculty Award (The Monty Award)
  ▪ Chris Rasmussen, Department of Mathematics and Statistics
    Outstanding Faculty Award
• 1 award-winning doctoral student:
  ▪ Bridget Druken, Nicholas A. Branca Memorial Scholarship, 2012–13
• Outstanding staff award:
  ▪ Deb Escamilla, MSED

Visit the CRMSE web site at: http://crmse.sdsu.edu
EVENTS

The CRMSE Colloquium Series continued last year with eight presentations:

- **November 4, 2011**, Dr. Chris Rasmussen, Professor, SDSU Department of Mathematics and Statistics, presented *What I Did on My Sabbatical in Italy*.
- **November 11, 2011**, Dr. Morana Alac, Assistant Professor, Communication and Science Studies, University of California San Diego, presented *Digital Scientific Visuals as Fields for Interaction*.
- **December 2, 2011**, Dr. Mica Pollock, Professor, Director, UCSD’s Center for Research on Educational Equity, Assessment, and Teaching Excellence (CREATE), presented *Designing Communications for Equity in Schools*.
- **December 9, 2011**, Dr. Lisa Lamb, Associate Professor, and Dr. Jessica Pierson Bishop, SDSU School of Teacher Education, presented *Witches, Astrology, and Negative Numbers*.
- **February 10, 2012**, Dr. Igal Galili, Hebrew University of Jerusalem, presented *Cultural Content Knowledge and Science Education*.
- **February 17, 2012**, Dr. Joe Mahaffy, Professor, SDSU Department of Mathematics and Statistics, presented *Computer Lab for Calculus in the Life Sciences*.
- **March 21, 2012**, Dr. Susan Goldin-Meadow, Beardsley Rumi Distinguished Service Professor, Department of Psychology, University of Chicago, presented *How Our Hands Help Us Think*.
- **April 20, 2012**, Dr. Alexander Chizhik, Professor, SDSU School of Teacher Education, presented *Research Opportunities in The Lab Zone*

Sowder Reception
CRMSE hosted a reception on November 4, 2011, to celebrate the opening of the Sowder Library, contributed by Judy and Larry Sowder for use by students in the MSED program and CRMSE members. This great resource provides valuable support for our work.

Sowder Tribute and Conference
CRMSE organized *A Tribute to the Career of Dr. Judith Sowder: Linking Research and Practice in Mathematics Education* on January 13–14, 2012. Colleagues came from around the country to recognize Judy’s amazing career.

MSED Reception
On Friday, May 18, 2012, we held a graduation reception for seven recent MSED graduates and families (Corinne Lardy, Jen Lineback, Michelle Nolasco, John Siegfried, George Sweeney, Megan Wawro, Ian Whitacre).

National Conference
CRMSE participated in the first national conference for Centers of Science and Mathematics Education (CSME) on May 20–22, 2012 at the University of Utah in Salt Lake City, where we presented a poster and PowerPoint slides.

Distinguished Lecturer Series
The next CRMSE Distinguished Lecturer event will take place on October 25 and 26, 2012. Megan Bang of the University of Washington and Beth Warren from TERC will be this year’s Distinguished Lecturers. The focus of this year’s event will be improving teaching and learning of science for Native American children.
OUTREACH

Math Technology/CRMSE Innovation Lab
CRMSE hosted the Grand Opening of its Math Technology/CRMSE Innovation Lab on October 7, 2011, at SDSU in PA 117. The new Innovation Lab is a unique facility where faculty and researchers develop ways of studying mathematics by designing and constructing physical models and devices allowing for the engagement of touch, body motion, kinesthesia, and large-scale activities in the learning of mathematics. In addition to several computer-control machines to manufacture pieces, it includes a special classroom where groups of students can be video recorded for research on learning and design.

Union-Tribune Articles
Patrick Flynn, U-T Education reporter, contacted Ricardo Nemirovsky, and wrote an article, Looking at new ways to learn math, science—Joint SDSU-UCSD program aimed at improving teacher training, curriculum, that appeared on the front page on 11/8/11.

Karen Kucher, U-T Education Reporter, wrote NSF grant, Qual-comm funds to train science, math teachers—32 teachers will have five-year fellowships at SDSU!, on September 24, 2012. Congratulations to CRMSE faculty, Lisa Lamb, Meredith Houle, Susan Nickerson, Randy Philipp, Donna Ross, and Kathy Williams.

Fundraising
This past year CRMSE hired Ariane Grubb Kelly on a part-time basis to enhance our fundraising efforts to support our outreach programs including The Lab Zone, Innovation Lab and SEESE Seminar Series. In addition to submitting several proposals for external support, Ariane organized a fundraising dinner on Dec. 1, 2011, and a fund-raiser at Local Habit, a restaurant in Hillcrest, on January 23, 2012.

SDSU Science & Engineering Sampler
As part of the San Diego Festival of Science & Engineering, held on March 17, 2012, CRMSE sponsored two booths: The Lab Zone, led by Alexander Chizhik and Through the Looking Glass: Explore Patterns with Math Tools, led by Janet Bowers and Susan Nickerson.

Fourth Annual San Diego Science Festival and Science Expo
The Festival was held in March and concluded with an Expo Day in Petco Park on March 24. Ricardo Nemirovsky and Bohdan Rhodehamel led the CRMSE interactive booth entitled Prime Time With Spirographs: Gearing up to Prime Numbers and Motion Detector Demonstrations.

Office of Pathways to Science, Technology, Engineering, and Mathematics (STEM) Careers in Education
Director, Cynthia Park
In addition to the regular projects directed by Dr. Cynthia Park, the Pathways office organized several activities in support of CRMSE initiatives, including the recruitment of SDSU students for the SCI 250 course, the organization of a seminar about a new graduate program on informal mathematics and science education, and a field-trip visit by 300 middle school students to SDSU to promote math and science education.

Revising the K–8 Math Ed Masters to include the Math Specialist credentials
A group of faculty have been working on revising the K–8 Math Ed Masters degree program and the Math Specialist certificate program so that students may earn the new California Mathematics Instruction Added Authorization and the Mathematics Instruction Leadership Specialist credentials as part of the M-K–8 masters program.

Visiting Scholars
Hortensia Soto-Johnson, Associate Professor of Mathematics in the School of Mathematical Sciences, at the University of Northern Colorado, joined Ricardo Nemirovsky and his team from February 27 through April 6 (six weeks).

Igal Galili, from Hebrew University of Jerusalem, visited Fred Goldberg’s group.

Susan Goldin-Meadow, the Beardsley Rumi Distinguished Service Professor, Department of Psychology, University of Chicago, was hosted by Steve Reed.

Figen Uysal, from Bilecik University in Turkey, is working with Chris Rasmussen’s group through December.
PRIORITIES AND INITIATIVES

Advisory Board

The fifth meeting of the CRMSE Advisory Board was held on May 18, 2012, at CRMSE. CRMSE welcomes advisory members from the San Diego Community at large, who have interests in mathematics and science education. During the meeting, we reported on the work of CRMSE, highlighting our three initiatives, including the Lab Zone, the CRMSE Innovation Lab (which we toured), and work toward developing a new graduate program in informal mathematics and science education. We also discussed CRMSE’s fundraising efforts and identified volunteers from the Advisory Board to participate in follow-up discussions on CRMSE’s initiatives.

Advisory Board members include:

- Mike Chapin, Member, Board of Directors, San Diego Regional Economic Development Corporation
- Ernest Anastos, Superintendent, Lemon Grove School District
- Chris Deckard, Senior Scientist, K-12 Outreach, SPAWAR
- Barbara Edwards, Executive Director, Math for America, San Diego
- Kristin Evans, Education Director, Birch Aquarium at Scripps
- Bernard Greenspan, Registered Patent Agent, Greenspan IP Management
- Nigella Hillgarth, Executive Director, Birch Aquarium at Scripps
- Marcia Mattson, Director of Educational Services, Lemon Grove School District
- Arthur Olson, Director, Molecular Graphics Laboratory, Scripps Research Institute
- Ned Smith, Science and Technology Working Group; Chair, San Diego Foundation
- Nancy Taylor, Executive Director, SD Science Alliance; K-12 Science Coordinator, SDCOE
- Bruce Westermo, Asst. Dean for Student Affairs, College of Engineering, SDSU

The involvement of members of the CRMSE advisory board has led to revising existing initiatives and developing new initiatives.

CRMSE Initiatives

CRMSE Lab Zone

The Lab Zone is an after-school program conducted two days per week at the Lemon Grove Academy for the Sciences and Humanities. Led by Alexander Chizhik (CRMSE member), SDSU students enrolled in SCI 250: Learning Science and Math in Informal Education Settings plan and conduct enrichment activities with middle school students. The Lab Zone is a good opportunity for undergraduates to learn about math and science teaching while providing learning experiences for middle school students.

During the 2011-12 school year, the Lab Zone was held at Palm Middle School in the Lemon Grove School District. The Pathways Office conducted recruitment of SDSU students to enroll in the SCI 250 course (“Learning Science and Math in Informal Education Settings”) taught by Alexander Chizhik. This year SCI 250 was approved for General Education credit, so we’re hopeful that this status will enable us to include even more undergraduate students. Ten students enrolled in the class. Approximately 30 middle school students participated twice a week.

STEM Education, Economics, and Equity (SEEE) Seminar Series

Along with collaborators from the University of San Diego, SD Economic Development Corporation, the SD Science Alliance, and the League of Women Voters San Diego, CRMSE hosted three seminars:

- Only Life Educates: Mobilizing Cultural Resources for Teaching and Learning on November 3, 2011, at USD, with featured speaker Luis Moll, Professor of Language, Reading, and Culture at the University of Arizona.
- STEM or STEAM? Integrating the Arts into STEM Education, held on October 1, 2012, at the SDG&E Energy Innovation Center.

Fundraising

CRMSE would like to thank all who have donated to support our outreach programs including The Lab Zone, Innovation Lab
and SEEE Seminar Series. A small donation can go a long way and it isn’t too late to give back to CRMSE and our local community. Please think about giving a one-time donation or even a monthly pledge. All donations are tax deductible. More information is available on CRMSE’s website at: http://crmse.sdsu.edu

We would like to highlight the following donors for their generous contributions to CRMSE’s Outreach Programs:

**Individual Donors**
- Nadine & Steve Bezuk
- Mike Chapin
- Larry & Carol Holt
- Ric Hovda
- Ariane Grubb Kelly
- Stanley & Lisa Maloy
- Doug & Susan McLeod
- Ricardo & Cathy Nemirovsky
- Cynthia & James Park
- Randy & Margaret Philipp
- Steve & Karen Reed
- Larry & Judith Sowder
- The Sudberry Family

**Corporate Donors**
- League of Women Voters San Diego
- Local Habit
- Northrop Grumman
- SD Regional Economic Development Foundation
- San Diego Science Alliance
- Sea World
- Subaru of America

**Faculty Notes**

Jessica Pierson Bishop has left SDSU for the University of Georgia, where she will be an assistant professor in the Department of Mathematics and Science Education in the College of Education.

Vicki Jacobs has left SDSU for the University of North Carolina at Greensboro, where she will be the James D. and Johanna F. Yopp Distinguished Professor in the Department of Teacher Education and Higher Education.

We wish both Jessica and Vicki the best.

**Tom Impelluso** has been in Norway on a year-long sabbatical followed by a one year leave of absence. He is starting a school on-line education and working on a book on a new approach to 3-D Dynamics using Lie Algebra and Moving Frames.

**MSED Updates**

**MSED Graduates, 2011–2012**

Graduates (left to right): Ian Michael Whitacre, Megan Wawro (2011 grad), Jennifer Evarts Lineback, George Sweeney, John Siegfried and Michelle Nolasco (Michael Smith not pictured)

We are pleased to announce six new graduates from our MSED program.

**Dr. Jennifer Evarts Lineback’s** dissertation was entitled “Mrs. Miller’s Evolution in Teaching Science as Inquiry: A Case Study of a Teacher’s Change in Responsiveness”. Her advisor was Dr. Fred Goldberg. She has accepted a position at Pt. Loma Nazarene College.

**Dr. John (Zig) Siegfried’s** dissertation was entitled “The Missing Strand of Mathematical Content Knowledge: Defining and Assessing for Productive Disposition in Elementary School Teachers”. His advisor was Dr. Randy Philipp. He has accepted a position at James Madison University.

**Dr. Ian Michael Whitacre’s** dissertation was entitled “Investigating Number Sense Development in a Mathematics Content Course for Prospective Elementary Teachers”. His advisor was Dr. Susan Nickerson. He has accepted a position at Florida State University.

**Dr. George Sweeney’s** dissertation was entitled “Negotiating Meaning for the Symbolic Expressions for Vectors and Vector Equations in a Classroom Community of Practice”. His advisor was Dr. Chris Rasmussen. He is on the faculty at Santa Ana Community College.

**Dr. Michelle M. Nolasco’s** dissertation was entitled “Reciprocal Engagement Between Scientist and Visual Displays”. Her advisors were Dr. Ricardo Nemirovsky and Dr. Meredith Houle Vaughn.

**Dr. Michael A. Smith’s** dissertation was entitled “Methods of Mathematical Struggle”. His advisor was Dr. Ricardo Nemirovsky.

**Fourth-year MSED Students**

The fourth-year MSED students (Jaime Diamond, Dov Zazkis,
and Molly Kelton worked hard on their dissertation proposals, defending them this summer and early fall, and all are in candidacy.

**Third-year MSED Students**
The third-year MSED students (Spencer Bagley, Bridget Druken, Jessica Ellis, Brooke Ernest, and Mike Fredenberg,) were hard at work over the summer, studying for and taking their second-year exams, including both written and oral portions.

**Second-year MSED Students**
The second-year MSED students (John Gruver and Casey Hawthorne) had a good first year and continue to excel.

Casey taught Math 210 in the SDSU Department of Mathematics and Statistics. John worked as a research assistant with Janet Bowers and Susan Nickerson.

**Welcome new MSED Students**
This fall three new doctoral students joined the MSED program.

Michael Garcia received a masters degree from San Francisco State, and formerly was a math teacher at Abraham Lincoln High School. He is working with Janet Bowers and Chris Rasmussen.

David Quarfoot earned his masters degree from the University of Utah and formerly was a teacher at Choate Rosemary Hall in Boston. He is working with Chris Deckard at SPAWAR.

C. David Walters received masters degrees from Miami (OH) and Columbia Universities. Previously an eighth grade math teacher at the Salk School of Science in New York City, David is working as a teaching assistant this year in the SDSU Math Department.

**Student Research Symposium**
Four MSED students participated in the 5th Annual SDSU Student Research Symposium, held in March 2012. The symposium spotlighted original research from over 400 undergraduate, master’s and doctoral students. The MSED students and titles of their presentations follow:

- **Ian Whitacre**, A new analytic tool in the analysis of number sense development
- **Jaime Diamond**, Teachers’ beliefs about how to support the generalization of students’ learning
- **Bridget Druken**, Children’s symbolizing activities and tool use with negative integers
- **Jessica Ellis**, Who is leaving the STEM trajectory and why?

**MSED Alumni Updates**
Cody Sandifer (MSED Graduate) has been promoted to Professor at Towson University.

Amy Ellis (MSED Graduate) has received tenure and been promoted to Associate Professor at the University of Wisconsin at Madison.

**MSED Grads Participate in 2012 STaR Program**
Dr. Megan Wawro (Virginia Tech) and Dr. Charles Hohensee (University of Delaware), both 2011 MSED graduates, were selected to participate in the Service, Teaching, and Research (STaR) Project for early career mathematics educators. This induction program, funded by the National Science Foundation, includes a summer institute in Park City, Utah (July 15-20, 2012), structured networking opportunities, and a follow-up session at the annual meeting of the Association of Mathematics Teacher Educators in January, 2013.
Sowder Library Dedicated

Larry and Judy Sowder graciously donated hundreds of professional books and journals for use by the students of the MSED program. This is an amazing collection of important resources in mathematics and science education, including many out-of-print classics. The Sowder Library was dedicated during a reception held at CRMSE in November 2011. CRMSE members and MSED students alike are welcome to check out books from the collection, which is housed in the MSED Suite. Special thanks to Eve Montvilaite and Deb Escamilla for processing and cataloging the books.

Visitors

Carin Johansson and Rebecca Namanzi received funding from the University of Gothenburg in Sweden to participate in an international staff training program in April 2012. They met with their counterparts at SDSU: Deb Escamilla, the MSED Administrative Assistant; Karen Foehl, CRMSE Office Manager; and Julie Alsbrooks and Cindy Hicks of the SDSU Research Foundation.
Professional Accomplishments

Note: CRMSE members are in **bold** text, CRMSE associate members in *red*, and current and former graduate students in *orange* text.

**Nadine Bezuk** continued to serve in the following roles: Executive Director of the Association of Mathematics Teacher Educators (AMTE), as a member of the Advisory Board of the California Association of Mathematics Teacher Educators (CAMTE), as a member of CAMTE’s Math Specialist Credential Task Force, and as co-director of the San Diego Mathematics Project.

Tom Carey served as a Senior Partner, Carnegie Foundation for the Advancement of Teaching. He also served as a panel member for Pathways to Progress Redux, a retrospective review of the NSF National STEM Digital Learning initiative at the Science Education Research Center at Carleton College in April 2012.

**Jaime Diamond** successfully defended her dissertation proposal, entitled “Teachers’ Beliefs Regarding How to Support the Generalization of Students’ Learning”, on April, 30, 2012.

**Bridget Druken** received the Nicholas A. Branca Memorial Scholarship for 2012–2013. This scholarship continues Nicholas’ passion for the teaching and learning of mathematics in teachers across California, aimed at supporting the quest for continuous improvement of K–12 mathematics teaching.

**Deb Escamilla** was honored as the recipient of the 2012 Outstanding Staff Member of the Year Award for the College of Sciences Reception.

**Cynthia Park** received several awards, including the 2012 SDSU Alumni Association Award for Outstanding Faculty Contributions, fondly known as the “Monty” Award, for the College of Education. The Monty’s are a time-honored tradition at SDSU, sponsored by the SDSU Alumni Association. They were first awarded in 1971 in recognition of those who have made significant contributions to the university, the San Diego community or California, nationally or internationally. The Monty is a symbol of achievement and success presented to distinguished alumni from each of SDSU’s seven academic colleges, Imperial Valley Campus and Library and Information Access. Distinguished service awards also are given to an exceptional alumni volunteer and an outstanding university employee.

Dr. Park also received the 2012 SDSU Presidential Leadership Fund Faculty and Staff Excellence Award, designed to encourage and recognize the important work done by SDSU employees. Dr. Park was recognized for her tireless work to expose K–12 students from under-represented backgrounds to SDSU, building bridges to local communities through service-learning and supporting student success through mentorship. Dr. Park received one of five awards given to faculty/staff in Spring 2012 for their forward-thinking, excellence and innovation to the university.

**Randy Philipp** currently serves on several national advisory boards: (1) for the NSF-funded project, “Learning to Learn from Teaching”, directed by Rossella Santagata; (2) for the NSF-funded project, “Connecting Mathematics for Elementary Teachers”, directed by David Feikes; (3) for the NSF-funded project, “Mathematics Discourse in Secondary Classrooms (M-DISC): A Case-Based Professional Development Curriculum”, directed by Beth Herbel-Eisenmann, Michael Steele, & Michelle Cirillo; (4) for the NSF-funded project, “Development of Resources and Tools Project”; and (5) for the NSF-funded project, “Constructing Coherence: Elementary Teachers’ Strategies for Using Standards-Based Mathematics Curriculum Materials”, directed by Corey Drake.

Randy Philipp also currently provides service to several professional associations. He served as the chair of the Association of Mathematics Teacher Educators’ Task Force for CBMS Mathematics Education for Teachers II Report, as chair of the Digital Library of Practice Advisory Group (DLPAG) for the National Council of Teachers of Mathematics and as Member-at-Large on the Board of Directors of the Association of Mathematics Teacher Educators (AMTE).
Professional Accomplishments continued

Note: CRMSE members are in **bold** text, CRMSE associate members in *red*, and current and former graduate students in *orange* text.

**Vicki Jacobs** served as chair of the Editorial Panel for the *Journal for Research in Mathematics Education*.

**Joanne Lobato** serves on several national advisory boards: (1) for the NSF-funded project, “Measurement Approach to Rational Number (MARN)”, directed by Marty Simon; (2) for the NSF-funded project, “Measurement Approach to Rational Number (MARN)”, directed by Marty Simon; (3) for the NSF-funded project, “Framing Learning Contexts to Promote Transfer-of-Learning”, directed by Marty Simon; and (4) for the Kaput Center for Research and Innovation in STEM Education, University of Massachusetts at Dartmouth. She also participated in the Learning Progressions Footprint Conference, a working group of researchers funded by the National Science Foundation in July 2011, in Washington DC.

**Chris Rasmussen** was named the Outstanding Faculty Member in the SDSU Department of Mathematics and Statistics in 2012.

**Ricardo Nemirovsky, Brooke Ernest, and Bohdan Rhodehamel** participated in the inaugural Art and Undergraduate Mathematics Education exhibit at the 2012 SIGMAA on RUME conference in Portland, Oregon. They contributed four different types of artwork for the exhibit:

1. Airbrush paintings created by different students from Ricardo’s Intro to the Foundations of Geometry classes. Students in the classes used Geometer’s Sketch Pad to create designs using either inversive geometry or projective geometry. We then used a vinyl cutter to cut stencils for the students to use with the airbrush.

2. Quilts, with squares created by a different student from Ricardo’s Math 509 class (Computers in Teaching Math). The quilts were accompanied by two iPads containing an interface that allowed viewers to select a quilt square and then watch a video of the student discussing their square. Students created their designs in GSP using complex function transformations. Their designs were then digitized using embroidery software before they were embroidered.

3. DeSargue Theorem Sculpture, created by Ricardo and Bohdan, using ABS plastic and wooden dowels. Ricardo used the sculpture in class (Intro to the Foundations of Geometry) as a means to demonstrate a proof of the DeSargue theorem. The sculpture was modeled in Solidworks, the joints and points were then printed on a 3-D printer, and the triangles were cut on a laser cutter.

4. Dandelin Spheres Ellipse Sculpture, created by Ricardo and Bohdan, using acrylic with an HDPE base. The sculpture was modeled in Solidworks and then the planes were cut in the laser cutter. Ricardo used this piece in his math 509 class as part of a unit on conic sections.
Publications 2011–Present

Note: CRMSE members in **bold** text. CRMSE associate members are in *red* text Current and former graduate students in *orange* text.


Bush*, S.D., N.J. Pelaez*, J.A. Rudd*, M.T. Stevens*, K.S. Williams* (*all co-first authors listed alphabetically). 2011. Investigation of Science Faculty with Education Specialties (SFES) within the Largest University System in the United States. CBE–Life Sciences Education 10 (1): 25–42. This article also appears in the CBE–Life Sciences Education *Highlights of 2011* special edition, pp. 86–103. “Articles are selected to represent the breadth of work published in the journal and to be exemplars of life science education research and evidence-based practice.” It was also named by the journal *Science* (vol 332:14; 1 April 2011) as an “Editors’ Choice: Highlights of the Recent Literature.”


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Note: CRMSE members in **bold** text.


**Integrating Regional Knowledge Exchange Networks into 3CSN**, 2012–2013, directed by **Tom Carey**, funded by the Los Angeles Community College District and California Community College Success Network.

**Computing Principles for All Students’ Success (ComPASS)**, January 2012–2015, directed by **Alexander Chizhik**, funded by the National Science Foundation. Seeking an effective strategy for building a computationally savvy 21st century workforce for US global leadership, this project will establish a multi-pronged, flexible, scalable training and support of instructors to teach a CS Principles course targeted to all students entering post-secondary education, thereby accelerating implementation of broadbased, inclusive, and motivational education in computing foundations and computational thinking for all students in San Diego high schools. The ComPASS project seeks to springboard Southern California students into computing education, impacting ~5000 students, 105 pre-service teachers, and 19 in-service teachers. Leveraging UCSD’s successful pilot of the CS10K project’s proposed AP CS Principles, we will build local capacity and competency in teaching this course in the 2 leading San Diego-area universities, 5 local community colleges, and 15 local high schools.

**Harnessing social dynamics of learning groups in mathematics and science education: A 3-year program of workshops and consulting**, May 2012–2015, directed by **Alexander Chizhik**, funded by Fulbright Scholar Grant. This serial, three-year project at the South Ukrainian State Pedagogical University (SUSPU) in Odessa, Ukraine, will take place during the summers of 2012–2014 with a series of workshops for future teachers of mathematics and science on “Harnessing social dynamics of groups to engage cognitive conflict and social cooperation during learning of mathematics and science.” In addition, the project includes consultation with SUSPU instructors and graduate students on their research and instruction. Communication and collaboration with instructors and graduate students will continue during each school year between periods of physical presence in Odessa.

**Mapping Developmental Trajectories of Students’ Conceptions of Integers**, August 2009–July 2013, directed by **Lisa Lamb, Randy Philipp, and Jessica Pierson Bishop**, funded by the National Science Foundation. Making sense of integers is particularly challenging for children and yet is foundational for success with first-year algebra coursework. In this research and development project, we will map developmental trajectories of students’ conceptions of integers. We will analyze 120 interviews across K–12 students and 30 interviews of specialized adults (those who have revisited their notions of integers by drawing from one of four perspec-
tives: a formal mathematics perspective, a historical mathematical perspective, a children’s mathematical thinking perspective, and a mathematics teacher perspective). Collectively, the conceptions identified across these interviews will help us to map the terrain from informal to expert conceptions of integers. We propose to use findings from the interviews to create a framework to identify problem types as well as problem-solving strategies as related to student thinking about integers and integer operations. Because we will identify increasingly sophisticated conceptions, teachers and researchers can use the developmental trajectories to understand students’ thinking about integers and to plan next steps to support students’ reasoning. To broaden the applicability of our findings, we will use the results from the interviews and subsequent framework to develop a paper-pencil assessment that can be used by teachers and researchers.

Talent Search Competitive Renewal, 2011–2016, directed by Cynthia Park, funded by the US Department of Education.

Upward Bound (Classic) Competitive Renewal, 2012–2017, directed by Cynthia Park, funded by the US Department of Education.


Investigating the Needs of Elementary School Teachers of Mathematics at Different Points During Sustained Professional Development, June 2005–May 2012, directed by Randy Philipp and Vicki Jacobs, funded by the National Science Foundation. This research project was funded to map a trajectory for the evolution of elementary school teachers engaged in sustained professional development. In Study 1, we will use a cross-sectional design to explore the knowledge, beliefs, and practices of three groups of teachers engaged in sustained professional development for different amounts of time. To provide an anchor for the trajectory, we will also investigate prospective teachers. Children’s mathematical thinking and classroom artifacts play prominent roles in our measures, analytic lens, and professional development contexts. In Study 2, we will collaborate with facilitators from multiple national projects and track how our findings can inform their work with prospective and practicing teachers.

Improving Student Success in Calculus, 2012–13, directed by Chris Rasmussen, funded by the San Diego State University President’s Leadership Fund.

Project PLURIS: Purposeful Learning in Undergraduate Research and Independent Studies, August 2011–July 2013, directed by Kathy Williams.

BioHUB: An Internet HUB for the Conceptual Assessment in Biology Community, August 2011–July 2013, directed by Kathy Williams and Kathleen Fisher, funded by the National Science Foundation.
**RECENT PRESENTATIONS**

Note: CRMSE members in **bold** text. CRMSE associate members are in *red* text. Current and former graduate students in *orange* text.


**Bezuk, N.** (2011, November). *Strengthening fraction reasoning to lay the foundation for algebra success*. Regional meeting of the National Council of Teachers of Mathematics, Albuquerque, NM.


**Carey, T.** (2011, March). *Regional Knowledge Exchange Networks for Developmental Math Faculty, presentation at the annual conference of the Rethinking Pre-collegiate Math Project*, Washington State Board of Technical and Community Colleges, Tacoma WA.


**Druken, B.K.** (2012, March). *Children’s Symbolizing Activities and Tool Use with Negative Integer*. Student Research Symposium, San Diego State University, San Diego, CA.


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Lamb, L. & Bishop, J. P. (2011, December). Witches, astrology, and negative numbers. Colloquium presented for the Center for Research in Mathematics and Science Education and the School of Teacher Education at San Diego State University, San Diego, CA.


